

Module 11

Cattle Viscera, Carcass, and Liver Disposition

Part III

The inspection of the liver is relatively easy; however, it is a very important part of viscera inspection. The liver is one of the first organs to undergo gross changes when an animal suffers from a fast-acting disease caused by microorganisms or infectious diseases. And it is also one of the last organs to return to normal should the animal's system overcome the disease condition. Therefore the liver must be observed closely, accurately, and always maintained with a carcass that is retained for a disease or abnormal condition.

The easiest way to inspect a liver is to insert your finger into the portal vein and apply a slight tension as you slice the hepatic lymph nodes thinly, at the same time observing all cut surfaces of the node.

The next step is to open the bile duct. You perform this procedure carefully, so as not to cut through the duct into the liver tissue itself. Some flukes are small and of nearly the same color as the liver tissue and any not be seen if the duct is mutilated. The cut is made along the duct's long axis as far ventrally as possible; while cutting the duct you will be observing its contents.

Last, but just as important, you will thoroughly palpate and observe the ventral surface of the liver, turn the liver over (again using the portal vein and not the gall bladder), palpate the renal impression, and palpate and observe the dorsal/parietal surface of the liver.

As some of you probably know by now, many of these plants slaughter pretty fast. That's probably no big deal except to the new employee. When you are first assigned to the liver inspection station you have your hands full. Not only are you making the required incision and palpations, but you must also make a disposition.

There are several conditions that affect livers, and also varying degrees of involvement. You must be capable of making a split-second decision on that liver and your decision must be accurate.

For these reasons, the liver disposition supplement should be studied carefully. For your reference, a disposition chart is located at the end of this section.

Liver Abscess

The most common reason for rejection of livers is the abscess. An abscess is a

circumscribed area of pus with related swelling and/or inflammation caused by a variety of factors. Abscesses may be associated with specific diseases, but are usually seen as localized conditions. Many feedlot cattle (fat) have localized abscesses and the cause seems to be related to high-energy cereal diets, with unsanitary feedlot conditions also a factor.

An abscess may appear on the surface and be quite obvious, or it may be located under the surface, and only detected when you palpate properly. (You must remember to palpate deeply to detect hidden or invisible conditions.) You may make as many incisions as you feel necessary to search for abnormal conditions, but remember you should never mutilate product unnecessarily.

In *all* cases, a liver containing an abscess is condemned as not fit for human consumption!

Benign abscesses (nonmalignant, and judged *not* to be affecting surrounding tissue) may be salvaged for animal food *after* removal of the abscess itself.

"Sawdust" and Telangiectasis (Telang)

These conditions, while appearing different visually are both considered to be different stages of spotty inflammation and degeneration (focal hepatitis) of the liver.

The condition in which a liver has pinkish-white to yellow-gray necrotic (dead) spots that make the liver appear as if sawdust had been sprinkled or scattered through it is called "Sawdust." The area around the spots appears normal and the liver's surface over the spots is usually smooth.

The condition in which a liver has purple-red to bluish-black spots present both on the surface as well as throughout the organ is called Telangiectasis and is referred to as "Telang." Usually the surface of the liver is slightly depressed when affected with Telang.

Sawdust and Telang conditions seem to have unknown etiologies. Some scientists feel that sawdust will eventually lead to Telang. Other scientists feel the reverse is true. You and I need to know how to detect either condition and their dispositions.

To determine the disposition of sawdust and Telang conditions, *three* degrees of involvement are used.

1. Slight: Where the lesions are small in size and slight in number.

A liver meeting the slight criteria is passed for food without restriction!

2. More severe than slight but involves *less* than one-half of the organ: The portion of the liver that is *not* affected or only slightly involved may be passed for food without restriction, while the remainder of the liver is condemned.

NOTE: The division of an organ as indicated here must be accomplished by one cut through the organ. (This *does not* mean your inspection search is restricted to a specific number of incisions.)

3. More severe than slight and involves *more* than one-half of the organ: The entire organ is condemned. (It may be salvaged for animal food.)

Liver Flukes (Distoma)

The liver fluke can be found in most domestic and some wild game animals. It requires and immediate host which is usually the food animal, from which the parasite may be transmitted to humans by ingestion in our meat diet.

The appearance of a fluke infested liver depends a great deal on the amount of fluke infestation. A slight infestation will probably not affect the liver tissue as such. A heavy infestation may cause a cirrhotic effect on the organ, with the surface becoming scarred. Many times there are bumpy, raise and/or depressed areas, and sometimes a discoloration showing dark blue to black sections on and within the tissue. The liver may take on a "hobnail appearance."

The primary purpose in opening the bile duct during liver inspection is to detect flukes. When there is a fluke infestation the bile duct may be thickened and sometimes swollen; frequently you will observe live flukes.

The three liver flukes most often seen in domestic cattle today are: *Fascioloides magna*; *Fasciola hepatica*; *Dicrocoelium dentricum* (Lancet).

The lancet fluke is the smallest of the three and is most commonly found in the northeastern section of the country. It is also the one most often missed during inspection. Since it is small, there must be a large population to cause any visible liver damage. When the inspector opens and cuts through the bile duct into the liver tissue, the lancet fluke becomes hard to detect. The lancet fluke is approximately the same color as the liver tissue. It is necessary that you work to gain the skills necessary to properly expose the bile duct, and then do so in a careful manner. The lancet fluke life cycle includes two intermediate hosts. The first is a snail, which deposits a tadpole-shaped larva. This larva is ingested by the ant, which in turn is ingested by the host animal during normal grazing.

Fasciola hepatica has worldwide distribution. It is the most common cause of liver fluke disease in the United States today. This liver fluke ranges in size from one to two inches by one-half inch. It is rather leaf-shaped with a cone projection on the front.

This gives it a "broad shouldered" appearance. As the adult fluke migrates through the bile duct and eventually into the liver tissue, irritation occurs. Some irritation and subsequent liver damage is caused by the spiny attachments on the cone projection, which is the fluke's means of locomotion. Another side effect of fluke infestation is icterus due to bile duct blockage.

The life cycle of *Fasciola hepatica* includes the snail, which is ultimately eaten by the host animal during its grazing.

Fascioloides magna is the largest of the flukes seen in domestic cattle today, approaching four inches by one inch in size. *F. magna* lacks the cone projection and "shoulders" of the common liver fluke, and is generally tongue-shaped.

The lesions in cattle usually show up as cyst-like cavities which do not communicate with the liver ducts. A black pigment tends to permeate the liver and sometimes adjacent tissues such as the peritoneum and cause extensive damage to the liver.

Even though the life cycle includes the snail, it is felt that deer are also required for completion of the cycle. Therefore when cattle are grazing in areas where deer are prevalent, the possibility of *Fascioloides magna* infestation is greater.

In all cases of liver fluke infestation the liver is condemned and not eligible for human consumption. The liver *may* be salvaged and used for animal food.

Carotenosis

A liver with carotenosis is characterized by a highly colored yellow-orange color or pigmentation. This condition is quite common in cattle livers and may cause the liver to become enlarged, soft, and friable (easily crumbled).

The MPI Manual suggests that you use a practical test to assure the correct recognition of carotenosis. The test is made by placing a white paper towel or napkin on the cut surface of a liver suspected of being affected with carotene discoloration. An orange-bronze stain would be indicative of carotenosis.

The liver is condemned and not eligible for use as human food but *may* be salvaged for animal food uses.

The pale-colored liver found in near-term cows may resemble carotenosis. For this reason you must be sure of your diagnosis. The pale liver may vary from tan to yellow to gray in color and may be enlarged. Usually the cut surface feels greasy. The cause of this pale liver is thought to be the result of a change in fat metabolism of the near-term cow. Livers from cattle that are normal except for the pale color are passed without restriction.

Hydatid Tapeworm Cyst

Hydatid cysts may occasionally affect livestock. Most domestic food animals are the intermediate host for this tapeworm cyst, which usually is a result of the tapeworm (*Enchinococcus granulosus*) of dogs. While the animal eats or grazes, it consumes the eggs, probably deposited by the dog, and the eggs in turn change to larvae in the food animal's system. The larvae then end up in various organs via the blood stream.

The cyst will vary in size but may be as large as two to four inches in diameter. The fluid inside the cyst is usually clear and colorless. You must be careful not to confuse the hydatid cyst with an accessory gall bladder.

The organ or part affected with a hydatid cyst is condemned and is *not* suitable for use in animal food.

These conditions are the most commonly seen and are the ones you must be familiar enough with to make an accurate, immediate disposition.

Other liver conditions do occur. Generally speaking most would be seen so seldom, or would be associated with other gross pathology, that you should consider retaining *all* parts of the carcass for veterinary disposition when you detect them.

Tally of Condemned Livers

Another responsibility that you, as the viscera inspector, will most likely be expected to perform is the tally of condemnation, it only follows that the viscera inspector will have first-hand knowledge of those condemnations.

At the end of each day's operation you will make available to the veterinarian in charge a list showing the number of and reason for each liver condemned.

There are a number of ways this tally can be accomplished. It is not the intent of this module to specify any one method over another, but only to give you some idea of methods being used in the plants today. For example a pencil and paper tally may be kept. Some plants have provided numerical counters. There are many other variations of these, but whatever method you are using, be sure the count is reasonably accurate.

Control of Condemned Livers

Those livers that *are* condemned, but which the company has indicated it wishes to salvage for animal food, must be handled properly before they may be shipped from the plant as animal food livers.

HRDS has published an indepth guide describing a step-by-step procedure for the control and handling of those condemned livers that are eligible for animal food. You

should become familiar with this guide. It is entitled "Identification, Control, and Denaturing of Condemned Livers for Animal or Fish Food."

The following is a brief recap of this publication. Those livers condemned for human food but to be salvaged for animal food must be properly handled. This includes:

1. The livers must be marked "U.S. Condemned."
2. The condemned livers may be held in containers on the slaughter floor, or may be worked as inedible product during the slaughter procedure.
 - a. When the condemned livers are placed in a container, the container must be plainly marked "inedible." Now because there is the possibility that these condemned items could improperly end up in edible channels, you *must* see that the product in these containers is maintained under security at *all* times. This means under your direct supervision, or locked or sealed in a container with an official device until such a time that the product *is* properly denatured.
 - b. When the plant requests an opportunity to slash and denature the condemned livers during the slaughter operation, it *may* be done, provided it doesn't create problems of control, security, or contamination.

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Supplement Part III [Liver Disposition]

Complete the following:

1. A liver showing five pinpoint sawdust lesions on one end may be passed for food without restriction. (Circle your answer.)
 - a. True
 - b. False
2. Select the proper disposition of a liver showing numerous sawdust lesions that are confined to less than 1/2 of the liver. (Circle your answer.)
 - a. It must be condemned in its entirety.
 - b. The affected portion of the liver must be removed and condemned. The remaining portion may be passed for food.
 - c. The entire liver must be condemned, but may be salvaged for animal food.
 - d. None of the above.
3. A liver with numerous "Telang" lesions, confined to approximately three square inches on the small end of the liver and three square inches on the heavy end of the liver (Circle your answer.)
 - a. may be passed for food after removal of the lesions.
 - b. must be condemned, but may be salvaged for animal food.
 - c. may be passes for food without restriction.
 - d. none of the above
4. Define the term "slashing" when used to describe the handling of animal food products.

5. Define the term "denaturing" when used to describe the handling of animal food livers, and give one example of an approved animal food denaturant.

6. It is acceptable to pack animal food livers in a container that has the inspection legend intact. (Circle your answer.)

a. True

b. False

If you answered false, state in writing why.

7. One of the following conditions requires that the entire liver be condemned, and ineligible for use as an animal food. (Circle your answer.)

a. Carotenosis

b. Benign abscess

c. Hydatid cyst

d. Flukes (Distoma)

Liver Disposition Chart

Disease or Condition	Degree	Disposition
Telangiectasis Sawdust Spotted	Slight	Pass for human food
	The affected portion trimmed when less than 1/2 of liver is more than slight	Condemn/Use for animal food
	Balance of this liver is slight or less	Pass for human food
	More than slight involving 1/2 or more of liver	Condemn/Use for animal food
Contamination	Excessive	Condemn/Tank
Cirrhosis	Any amount	Condemn/Use for animal food
Nonmalignant change	Any amount	Condemn/Use for animal food
Abscesses-benign (trim)	Localized - Affected area	Condemn/Tank
	Localized - Non-affected area	Condemn/Use for animal food
Flukes	Any evidence of infestation	Condemn/Use for animal food
Hydatid Cyst	Any amount	Condemn/Tank
Abscesses (Not benign)	More than localized	Condemn/Tank
Carotenosis (yellow)	Any amount	Condemn/Use for animal food
Other Parasites	Numerous lesions and cannot be removed	Condemn/Use for animal food
	Localized: Affected area trimmed	Condemn/Use for animal food
	Localized: Non-affected area	Pass for human food

References: Regulation 311.25
 Regulation 311.31
 Regulation 314.10



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